DOCUMENT RESUME

ED 039 176 SP 003 842

AUTHOR Brashear, Robert M.; Davis, O. L., Jr.
TITLE The Persistence of Teaching Laboratory Effects into Student Teaching: A Comparative Study of Verbal Teaching Behaviors and Attitudes.
PUB DATE Mar 70
NOTE 13p.; Paper presented at annual meeting, AERA, Minneapolis, 1970

EDRS PRICE EDRS Price MF-$0.25 HC-$0.75
DESCRIPTORS *Behavior Change, *Changing Attitudes, *Microteaching, Persistence, Research Needs, *Student Teachers, *Student Teaching, Teacher Attitudes, Teacher Behavior

ABSTRACT

Earlier research has demonstrated that verbal teaching behaviors can be modified through the Teaching Laboratory (TL), which consists of peer group microteaching experiences. This study investigated whether or not these behaviors would persist into later student teaching. Each of 50 secondary student teachers, who were divided into control and experimental groups, was observed twice during his student teaching--early and late--by trained observers using the OScAR 5V. Each student also took a semantic differential test twice to indicate his attitudes toward his education, teaching, and pupils. Analysis of observation results showed that the two groups differed significantly in only one of the 18 behaviors measured by OScAR 5V--non-TL students made more directing/rejecting utterances. Behaviors assumed to have been acquired during the TL may not have persisted owing to intervening course work, differences between the TL and schools, attrition, low observer reliability, and confusion about coding. Attitude differences, however, were significantly different, suggesting that the reality-based experiences of the TL may have induced attitudes in TL students similar to those of beginning teachers. Future research should investigate whether reinforcement of desired behaviors in the interim between the TL and student teaching would affect persistence. (LP)

ED039176

THE PERSISTENCE OF TEACHING LABORATORY EFFECTS INTO STUDENT TEACHING: A COMPARATIVE STUDY OF VERBAL TEACHING BEHAVIORS AND ATTITUDES

by

Robert M. Brashear

WESTERN MICHIGAN UNIVERSITY

-and-

O. L. Davis, Jr.

UNIVERSITY OF TEXAS

Prepared for Paper Session at AERA

Annaul Convention, Minneapolis, Minnesota 1970

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

SP003842

THE PERSISTENCE OF TEACHING LABORATORY EFFECTS INTO STUDENT TEACHING: A COMPARATIVE STUDY OF VERBAL TEACHING BEHAVIORS AND ATTITUDES

The Problem. An adaptation of microteaching was incorporated by Davis (1969) into the introductory course in curriculum at The University of Texas at Austin. This adaptation, called Teaching Laboratory (TL), was basically a peer teaching experience consisting of a set of task oriented instructions, space for small groups of students to teach and reteach six to eight cycles of lessons based on these instructions during a semester, and facilities which permitted students and instructors to replay audio and/or video tapes of these lessons for feedback purposes. By the Spring semester of 1969, some secondary student teachers had been exposed to TL experiences prior to their student teaching and some had not. The purpose of this study was to determine whether the verbal classroom teaching behaviors as indicated by a system of interaction analysis, and the attitudes of these student teachers toward certain aspects of the student teaching experience, as indicated by a semantic differential, were significantly different as a function of the TL experiences preceding the student teaching assignment.

Hypotheses. The two null hypotheses to be tested were:

1. Verbal classroom teaching behaviors of student teachers who have participated in Teaching Laboratory experiences prior to the student teaching assignment do not differ significantly from verbal classroom teaching behaviors of student teachers who were not exposed to TL experiences.

2. Attitudes toward certain aspects of the student teaching experience do not differ significantly between teachers who participated in TL experiences and those who did not.

Significance. This study may be viewed as one of a number of investigations at the University of Texas which combined microteaching with interaction analysis to focus upon various facets of teaching. Smoot (1968) used a modification of OScAR 5V, which he called LOScAR, to compare verbal teaching behaviors of groups of teacher candidates during the semester of their TL experience. Experimental groups were given training in the use of LOScAR; control groups were not given this training. Davis and Smoot (1969) used the LOScAR to compare behaviors of teacher candidates with and without TL during the laboratory semester. Emmer and Millett (1968) used the Flanders system for a similar comparison at the end of the TL semester. Carll (1969) and Kysilka (1969) studied verbal behaviors of inservice teachers with OScAR 5V. Morse (1969) used a similar observation schedule to study questioning behaviors of teacher candidates. Gregory (1969) employed LOScAR II to study effects of instruction in problem solving on beginning curriculum students. Hoover and Kirby (1969) studied the effects of differential feedback with OScAR 5V as the criterion measure.

The study by Davis and Smoot established that dramatic differences in verbal teaching behaviors may result from only a minimal exposure to TL experiences. Emmer and Millett found differences of this nature persisting to the end of the TL semester, although some loss of strength occurred. The present study inquired into the persistence of these differences into the later student teaching experience. This study further compared TL and non-TL groups with respect to certain semantic dimensions.

Subjects. Student teachers in English, social studies, and mathematics were observed. Sizes of groups are shown in Table 1.

Table 1.

Composition of Comparison Groups
by Teaching Fields

Teaching Field	Laboratory	Non-Laboratory
English	13	13
Social Studies	7	7
Mathematics	6	4
Totals	26	24

Each student teacher was observed twice during his period of active teaching responsibility. The first observation was made during the second week of teaching, and the second observation was made during the sixth week of teaching in an eight-week teaching experience. Observation lasted for twenty-five minutes at the beginning of the class hour. Observational data were subjected to analysis of covariance procedures. Computed were: adjusted treatment group means for each OScAR category, F ratios, and probabilities that differences in group means were due only to chance.

Observers. Observers were obtained from an advanced graduate curriculum course in which the requirement was made that each member of the class participate in a specific research project concerning the analysis of teaching. Two university supervisors with previous experience in using OScAR 5V participated in the observations on a standby basis, although they were not enrolled in the curriculum course. Thirty-seven observers began the training procedure. An experienced trainer of observers trained the members of the curriculum class. Earliest assignments of observers to student teachers were made as soon as observer reliabilities, as computed by Scott's Index (1955), reached .70. A reliability check of the entire class was made in the first week of March, 1969. Class members whose coefficients of intercoder reliability were lowest were removed from the list of observers. The remaining twenty-four were assigned to observe two student teachers each during the second weeks of March and April, 1969. One member dropped the course, leaving twenty-three assigned observers whose reliability coefficients ranged from .44 to .71 with an overall average of .61.

A final check of the reliability of the entire class was made early in the second week of April, 1969. Reliability data of unassigned class members were discarded, as were observational and reliability data of those scoring lowest in the final check. By this process, fifty student teachers were observed by sixteen graduate students and two university supervisors. The university supervisors were observing at the .80 level, while reliability

coefficients of the sixteen graduate students ranged from .41 to .62 with an overall average of .55. Two factors may have contributed to the lowering of these scores. Coder training sessions were not held during the previous week, since that week was the scheduled Spring break. The tape chosen contained high background noise at the volume level required for a large class.

Instruments. The Observation Schedule and Record, Form 5, Verbal, (OScAR 5V) is an instrument devised for the written recording of verbal classroom teaching behaviors as defined by eighteen categories and combinations of these categories (Medley and others,1968). Short descriptions of these categories are as follows:

1. Pupil Utterance Non-Substantive. Pupil makes a statement or asks a question not related to the subject matter.

2. Pupil Question Substantive. Pupil asks for substantive information.

3. Pupil Statement Substantive. Pupil offers substantive information.

4. Pupil Response. Pupil responds directly to another pupil or to the teacher.

5. Problem Structuring Statement. Teacher raises a substantive question or sets a problem without indicating who is to answer it.

6. Convergent Question. Teacher asks a pupil a question which calls for one right answer.

7. Divergent Question. Teacher asks a pupil a question to which more than one answer may be acceptable or correct.

8. Elaborating 1 Question. Teacher directs question to the same pupil who answered the question preceding it.

9. Elaborating 2 Question. Teacher directs question to a different pupil than the one who answered the preceding question. The second pupil must have heard the answer to the previous question.

10. No Evaluation. Teacher does not reply to pupil utterance.

11. Considering - Supporting. Teacher utterance with positive affect.

12. Informing - Approving. Teacher gives information or indicates, in a neutral way, that an answer was correct or acceptable.

13. Describing - Accepting. Teacher accepts pupil response or makes a statement not otherwise classifiable.

14. Directing - Rejecting. Teacher commands a pupil to do something or indicates in a neutral way that an answer is incorrect or unacceptable.

15. Rebuking - Criticizing. Teacher utterance with negative affect. Belittling, scolding, embarrassing.

16. Desisting. Teacher commands pupil to stop doing something in a neutral way or refuses permission.

17. Procedural, Neutral, Non-Substantive Question. Teacher asks question not otherwise classifiable; teacher neither refuses or gives permission.

18. Procedural Positive. Teacher utterances which offer a pupil a chance to initiate procedure; teacher gives permission.

A coding sheet was provided on which a mark was made each time a unit of behavior occurred which corresponded to one of the categories described above. Data gathered with the OScAR 5V were treated with analysis of covariance procedures, using COVARY (Veldman, 1967). Scores from the eighteen categories obtained in the early observation of each student teacher were used as covariates for corresponding scores obtained in the late observation. All computations were conducted on the CDC 6600 computer at the University of Texas at Austin.

A form of Osgood's Semantic Differential (Osgood, Suci, and Tannenbaum, 1957) was administered to all student teachers enrolled for English, social studies, and mathematics during the first week of the Spring semester of 1969. It was then administered during the final interview with the university supervisor to those student teachers chosen to be observed with the OScAR 5V. The concepts utilized in this particular semantic differential were: teaching, Ed. C. 332S (the introductory curriculum course), education courses, teacher's role, my ability to teach, teaching as a career, junior high pupils, and senior high pupils. The bipolar descriptors used for each of the above concepts were: complex/simple, soft/hard, boring/interesting, colorful/colorless, weak/strong, good/bad, passive/active, constrained/free, important/unimportant, and dull/sharp. A seven-point, forced choice scale was utilized with each pair of descriptors. Ordinarily, data collected with a semantic differential are submitted to factor analytic procedures, and comparisons are made between the factor structure of the data in hand and similar findings in comparable studies. Direct comparisons are possible, however, with analysis of covariance procedures (McNemar, 1962). Such analysis is more sensitive to change over time, as is the case in pre-post designs, or early-late designs as is this study. This sensitivity to changes in semantic dimensions over time led to the choice of the semantic differential for the present investigation.

The ten scale loadings yielded by the semantic differential for each of the eight concepts were combined by means of a computer program called ADEM (Brashear, 1969) to form the three principal factors found by Osgood and Suci (1955), namely Activity, Potency, and Evaluation. These data were treated with analysis of covariance procedures, using the stored COVARY program by Veldman. Adjusted treatment group means were computed, as were F ratios and probabilities that differences in group means were due only to chance. Comparison groups were, once again, the TL and non-TL student teachers, and scores obtained during the first week of the semester were used as covariated for scores obtained during the final interview.

Findings: Verbal Teaching Behaviors. Table 2 shows the summary of adjusted treatment group means, F ratios, and probabilities that differences in the adjusted means are due only to chance, for each of the eighteen OScAR 5V categories. For only one category was there obtained a statistically significant difference between the two groups of student teachers. Hypothesis One, therefore, was accepted for all OScAR categories except Direct/Reject, in which case it was rejected at the .01 level of significance.

Table 2.

Summary of Adjusted Comparison Group Means and Results of Analysis of Covariance of Late OScAR Scores When Early OScAR Scores Are Covariates

OScAR Categories	Adjusted Means Lab N=26	Adjusted Means Non-Lab N=24	F	P
PNS	3.70	5.20	0.44	0.519
PQU	3.65	5.68	1.92	0.171
PST	11.82	12.99	0.08	0.777
PRS	4.99	3.82	0.31	0.585
PBST	14.08	7.25	3.18	0.079
CVQ	11.72	10.19	0.06	0.806
DVQ	0.81	0.38	1.06	0.310
EI1	4.08	3.25	0.31	0.585
EL2	0.95	1.67	1.50	0.227
NOEV	7.38	2.96	2.32	0.133
CNSUP	0.63	0.90	0.56	0.533
INFAP	50.42	40.20	0.54	0.529
DSCAC	24.51	20.35	0.86	0.636
DIREJ	7.73	12.98	7.54	0.009**
RBCRT	1.49	2.22	0.81	0.622
DST	0.72	0.47	0.34	0.567
PRNSQ	0.86	2.23	2.56	0.114
PR+	2.11	2.42	0.09	0.759

** Significant at .01 level.

The measure which distinguished between the two groups of student teachers was the Direct/Reject category. This category recorded non-substantive commands and neutral indications that a pupil response was not acceptable. Student teachers without prior Teaching Laboratory experience used significantly more ($p = .009$) Directing and Rejecting utterances than did student teachers with TL experience. Student teachers with TL made sufficiently more Problem Structuring statements than non-TL student teachers to be considered "near signifidance." ($p = .079$).

The fact that the two groups differed significantly at the .01 level on one of the eighteen categories was not significant in itself (Sakoda, Coehn, and Beall, 1954). One statistic significant at the .01 level from eighteen calculated statistics could have been obtained by chance.

Findings: Semantic Dimensions. Tables 3, 4, and 5 summarize the adjusted comparison group means, F ratios, and probabilities that differences in adjusted means were due only to chance for the three Osgood factors of Activity, Potency, and Evaluation. Hypothesis Two was accepted for nineteen of the twenty-four computed statistics, rejected for three statistics at the .05 level, and rejected for two others at the .01 level of significance.

Table 3.

Summary of Adjusted Comparison Group Means and Results of Analysis of Covariance of Semantic Differential Ratings on the Activity Factor

Semantic Differential Concept	Adjusted Means Lab N=27	Non-Lab N-26	F	P
Teaching	6.27	6.36	0.27	0.611
Ed. C. 332S	4.06	3.18	7.49	0.008**
Education Courses	3.19	2.97	0.74	0.601
Teacher's Role	6.38	6.44	0.22	0.643
My ability to teach	5.50	5.88	3.89	0.051*
Teaching as a career	5.88	6.42	5.46	0.002*
Junior High Pupils	6.55	6.28	3.58	0.063
Senior High Pupils	6.24	6.16	0.02	0.895

*Significant at .05 level.
**Significant at .01 level.

Table 4.

Summary of Adjusted Comparison Group Means and Results of Analysis of Covariance of Semantic Differential Ratings on the Potency Factor

Semantic Differential Concept	Adjusted Means Lab N=27	Non-Lab N-26	F	P
Teaching	5.19	5.34	0.45	0.513
Ed. C. 332S	3.92	3.42	3.46	0.066
Education Courses	3.54	3.30	1.73	0.192
Teacher's Role	5.52	5.51	0.00	0.978
My ability to teach	5.18	5.11	0.07	0.723
Teaching as a career	5.11	5.55	2.87	0.093
Junior High Pupils	5.62	5.19	3.36	0.069
Senior High Pupils	5.41	5.16	1.05	0.312

Table 5.

Summary of Adjusted Comparison Group Means and Results of Analysis of Covariance of Semantic Differential Ratings on the Evaluation Factor

Semantic Differential Concept	Adjusted Means Lab N-27	Adjusted Means Non-Lab N-26	F	P
Teaching	6.52	6.60	0.32	0.579
Ed. C. 332S	4.62	3.92	3.27	0.073
Education Courses	3.58	3.64	0.73	0.598
Teacher's Role	6.40	6.72	8.02	0.007**
My Ability to teach	5.75	6.18	4.65	0.034*
Teaching as a Career	6.25	6.61	3.13	0.079
Junior High Pupils	6.26	6.39	0.68	0.581
Senior High Pupils	6.30	6.35	0.06	0.810

*Significant at the .05 level.
**Significant at the .01 level.

The Activity dimension was composed of the bipolar rating scales complex/simple, colorful/colorless, active/passive, and sharp/dull. Probably the least surprising finding of this study was the fact that the Activity dimension distinguished between the two groups of student teachers on the concept Ed. C.332S at the .01 level.

Discussion. This investigation does not corroborate the findings by Davis and Smoot (1968) of highly significant differences on seventeen of twenty-two LOScAR categories and by Emmer and Millett (1968) of significant differences on six of ten Flanders categories. A number of factors which may have contributed to this loss are suggested here.

Intervening course work between the introductory curriculum course and the student teaching semester, whether a part of the program of teacher preparation, a part of the teaching field, or neither of these probably had some effect on the student teachers. Influences of instructors in these courses might be considerable in terms of teaching styles or even specific mannerisms. Differences between instructors of the same intervening courses may have had some effect, as may differences in reading or writing assignments of Teaching Laboratory instructors.

The secondary school setting in which student teaching was done and observations were made was obviously quite different from the Teaching Laboratory setting with small groups of peers as students. Had measures been taken during

and at the end of the introductory curriculum course, but in the secondary school classrooms, noticeable differences might be expected. Or, had small groups of high school pupils rather than curriculum course peers been taught in the Laboratory setting, different results might be expected. The setting includes influences of cooperating teachers, "new" math, science, etc., in texts, socio-economic levels of schools in which student teaching was done, and administrative differences in matters such as discipline. Teaching Laboratory students may well have "over reacted" to the constraints of the student teaching experience. They also may have complied with it to the extent they did not use the knowledge and abilities they had. Teaching Laboratory opens up candidates to be themselves; student teaching seems to have a restricting, focusing influence.

Attrition during the teacher preparation sequence would alter the populations from which samples of student teachers were drawn. Some students who were involved in the introductory curriculum course, never reached student teaching. The possibility that losses of such students might obscure Laboratory versus non-Laboratory differences must not be overlooked.

Low reliabilities of observers may be a major source of variation in the data, thereby reducing the likelihood of real differences appearing in the data. Time limitations contributed to this low reliability in two ways. First, observers were necessarily trained during the semester in which they gathered the data of this investigation. Had time been available for observational maturation, reliabilities might be expected to stabilize at higher levels. Second, reliabilities improve with the number of observations of each teacher by each observer (Medley and Mitzel, 1958) until the number of observations reaches twelve. Time limitations barely allowed the two visits to each teacher (early and late) by each observer, not to mention twelve.

Discrete categories might reduce some intercoder unreliability. In this study, the eighteen OScAR 5V categories were used without modification. Three of these combined cognitive and affective components. Of these three, two contained half of all entries in the eighteen categories. Of these two, one was designated as a "catch-all" category, or one to be used when a unit of behavior was otherwise unclassifiable. The source of this unclassifiability may have resulted from ambiguity in the behaviors of the student teachers or from confusion on the part of the observer. The student teachers' behaviors may have been quite ambiguous. Whether student teacher verbal behaviors are more ambiguous than those of experienced teachers has yet to be verified. Whether separation of dual categories into discrete ones before coder training would improve reliability has yet to be verified.

The Directing - Rejecting category was subdivided by Kysilka (1969) in a study of grade level and subject matter diferences between experienced teachers. The Directing subcategory was the one criterion which distinguished between grade level groups of experienced teachers, while both Directing and Rejecting distinguished between mathematics and social studies teaching fields. The combined Directing - Rejecting category alone distinguished between comparison groups in this present study. This similarity of findings suggests closer scrutiny of this particular category. The use of significantly fewer Directing-Rejecting behaviors only on the part of Teaching Laboratory student teachers would indicate that this is the most persistent of the differences induced by

the Teaching Laboratory experience. Behaviors of this nature were not frequent enough for analysis in the Davis and Smoot (1968) investigation because peers serving as pupils in the Teaching Laboratory did not use these behaviors. College juniors would hardly be expected to give each other such well-defined directions which could be designated "commands." The Directing category is used largely in making assignments, which is not frequent among college peers. Far less likely is the frequent rejection of peer responses.

A greater number of significant differences might have occurred had the twenty-five minute samples been replaced by "episodes" as suggested by Amidon and Flanders (1967), and comparisons made between comparable episodes. The simple twenty-five minute time sample may easily have obscured important differences between such common classroom activities as checking the roll, checking homework, introducing new material, or supervised study.

Attitudes. Hypothesis Two, that attitudes toward certain aspects of the student teaching experience do not differ significantly between student teachers who participated in Teaching Laboratory experiences and those who did not, is rejected at the .01 level of significance. The findings by Calis (1950) of changes in attitudes in the positive or desired direction in the first six months of teacher education, but in the negative or undesirable direction in the first six months of teaching experience furnish a plausible basis for interpretation of Osgood data in the present study. The reality introduced into the preparation program (Davis and Gregory, 1968) by the Teaching Laboratory may well have induced an "experienced teacher set" not found in the non-Laboratory student teachers. Teaching Laboratory students may very well have been reflecting attitudes similar to non-Laboratory beginning teachers.

The one point at which student teachers with Teaching Laboratory experiences produced significantly higher semantic differential ratings than did student teachers without Teaching Laboratory deserves additional comments. The particular point was the intersection of Ed. C. 332S and Activity. Adjusted group means for the two groups were astride the neutral point on the scale. Though not significantly different, the same neutrality was expressed toward Ed. C. 332S on the other two factors and toward the concept Education Courses on all three factors. This finding is particularly striking when these means are compared with those on the remaining six concepts, which fell consistently between 75 percent and 90 percent of the high end of the scale. A preliminary analysis of variance showed that this difference in the two concepts from the other six accounted for 56 percent of the total variance found in the Osgood data.

Had this neutrality been observed on the Evaluation factor alone, its interpretation might be simpler. Since all three factors, Evaluation, Activity, and Potency contribute to this neutrality, the search must continue. Examination of the eight concepts suggest that the two in question are different from the other six in at least two respects. The two concepts, Ed. C. 332S and Education courses, carry institutional connotations that the others do not. The others might be characterized as individual or role-oriented. Consider also that these data were gathered during the student teaching semester, a point in time at which course work is largely behind the student teacher and professional self-concept considerations are immediately before. Add one

further bit of information, the finding by Johnson (1968) that significant differences in attitudes were found between student teachers who had already secured future employment and those who had not, even though the presence or absence of self-supervision was the experimental variable. Once again, the Activity-Reality-Specificity construct offered by Davis and Gregory (1968) offers the viable explanation that Teaching Laboratory students may be reflecting attitudes similar to non-Laboratory beginning teachers.

A point of interest with respect to the rejection of the second null hypothesis, for the concept Teacher's Role on the Evaluation factor, centers in the means of the two groups. Both means were greater than six on a seven-point scale, yet were significantly different at the .01 level. On a forced choice scale, variance is limited by the extremities of the scale. In effect, the significance of the difference between these two measures might conceivably be a result of the nature of the scale rather than a result of a true difference in evaluation of the role of the teacher involved. By contrast, the one other instance of a difference between means significant at the .01 level involved means which were astride the midpoint (4) of the scale, the point at which scores have greater freedom to vary. Consequently, the scaling on these two items deserves closer scrutiny. Separate administrations of the two concepts or expansions of the scale might be revealing.

Recommendations for Future Research.

Verbal teaching behaviors of beginning teacher candidates were modified in predictable and desirable directions by participation in the Teaching Laboratory, but these differences were found not to persist into student teaching. Future research should discover whether the reinforcement of selected Teaching Laboratory experiences subsequent to the introductory curriculum course, yet prior to student teaching, would enhance perseverance of desired teaching behaviors into the student teaching experience. The methods courses in the specific teaching fields are suggested as appropriate for this research due to their position in the teacher preparation sequence.

Replication of this investigation in a new institutional setting is indicated. Establishment of new behavioral and attitudinal base lines in a teacher education institution not yet utilizing Teaching Laboratory techniques, with subsequent introduction of Teaching Laboratory components at each possible discreet stage of the teacher education sequence, would seek to answer questions concerning the optimum point of introduction of Teaching Laboratory components, and concerning the amount and spacing of reinforcement of those components for which considerable persistence is desired.

The possibility of joint training of student teachers, cooperating teachers, and university supervisors in a system of interaction analysis is suggested, though the complexities of administration of such a program seem insurmountable. Future research is needed to explicate the numerous parameters of such a program, especially attitudinal parameters.

Application of more sophisticated research methodology is indicated. Procedures are available which indicate less than obvious relationships between

behavioral and attitudinal variables. These procedures should be extended to include such concomitant variables as instructional media, non-verbal teaching behaviors, and situational variables.

Concluding Statement:

The investigation of verbal teaching behaviors and attitudes of student teachers with and without Teaching Laboratory at The University of Texas at Austin prior to the Spring semester of 1969 was reported. The two groups were found to differ in certain attitudes, but not in verbal teaching behaviors. Suggestions for extension of this research were offered.

REFERENCES

Amidon, Edmund J. and Flanders, Ned A. "Interaction Analysis as a Feedback System." In Interaction Analysis: Theory, Research, and Application, edited by Edmund J. Amidon and John B. Hough. Reading Massachusetts: Addison - Wesley Publishing Company, 1967.

Callis, R. "Change in Teacher - Pupil Attitudes Related to Training and Experience." Educational and Psychological Measurement, 10: 718-727, 1950.

Carll, Carol Gene. "A Comparison of Verbal Teaching Behaviors in the Teaching of Mathematics in the Second and Fifth Grades." Unpublished Master's Thesis. Austin, Texas: University of Texas at Austin, 1969.

Davis, O. L., Jr. and Gregory, Thomas B. "Activity, Realism, and Specificity in Teacher Education," Research and Development Center for Teacher Education," The University of Texas at Austin, 1968.

Davis, O. L., Jr. and Smoot, B. R. "Effects on the Verbal Teaching Behaviors of Beginning Secondary Teacher Candidates' Participation in a Program of Laboratory Teaching." Research and Development Center for Teacher Education, The University of Texas at Austin, 1968.

Emmer, Edmund T. and Millett, Gregg B. "An Assessment of Terminal Performance in a Teaching Laboratory: A Pilot Study." Research and Development Center for Teacher Education, The University of Texas at Austin, 1968.

Gregory, Thomas B. "Problem Solving: The Development and Testing of a Manual of Teaching Tasks." Unpublished Doctoral Dissertation. Austin, Texas: University of Texas at Austin, 1969.

Kysilka, Marcella L. "The Verbal Teaching Behaviors of Mathematics and Social Studies Teachers in Eighth and Eleventh Grades." Unpublished Doctoral Dissertation. Austin, Texas: University of Texas at Austin, 1969.

McNemar, Quinn. Psychological Statistics. New York: John Wiley and Sons, Inc., 1962.

Medley, Donald M. and Mitzel, Harold E. "The Scientific Study of Teaching Behavior." In Theory and Research In Teaching, edited by Arno A. Bellack. New York: Teachers College Press, 1963.

Morse, Devin R. "A Comparison of the Effects of Laboratory and Non-Laboratory Instruction on the Questioning Behaviors of Beginning Teacher Candidates." Unpublished Doctoral Dissertation. Austin, Texas: University of Texas at Austin, 1969.

Osgood, Charles E. & Suci, George J. "The Factor Analysis of Meaning," Journal of Experimental Psychology, 50: 325-338, November, 1955.

Osgood, Charles E., Suci, George J. & Tannenbaum, Percy E. The Measurement of Meaning. Urbana: University of Illinois Press, 1957.

Sakoda, James M. & others. "Tests of Significance for Series of Statistical Tests." Psychological Bulletin, 51: 172-175, March, 1954.

Scott, W.A. "Reliability of Content Analysis: The Case of Nominal Coding." Public Opinion Quarterly, 19: 321-325, 1955.

Smoot, B.R. "The Effect of Training in Classroom Observation System Upon Verbal Teaching Behaviors of Secondary Teacher Candidates." Unpublished Doctoral Dissertation. Austin, Texas: University of Texas at Austin, 1968.

Veldman, Donald J. EDSTAT - V: Basic Statistical Computer Programs for the CDC 6600, Second Revision. Austin, Texas: University of Texas, Austin. 1968.